

CRITICAL ITEMS LIST

ASSY NOMENCLATURE: EVA WINCH

SYSTEM: 4.1, 4.2 AND 4.3

ASSY P/N: SED 33101570

SUBSYSTEM: 5.3

PAGE 23 OF 72

FMEA		NAME, QTY & DRAWING REF DESIGNATION	QTY	FAILURE MODE AND CAUSE	FAILURE EFFECT ON END ITEM	RATIONALE FOR ACCEPTANCE
REF	REV					
3D		EVA WINCH, (2) SED 33101570	2/18	Mode: Transmission jams Cause: • Material failure • Contamination	1. Unable to cradle RMS or payload which prevents closing payload bay doors 2. Unable to close payload bay doors Redundancy - 1. RMS jettison system. 2. Second EVA winch.	I Design Features to Minimize Failure Mode <ul style="list-style-type: none"> a. Safety factor of 1.4. b. Safety margin of 2. c. Stainless steel gears enclosed in aluminum housing. d. Tolerances used on parts to minimize binding caused by temperature extremes or contamination and to allow for dry film lubrication. e. Enclosed in aluminum case to prevent external entrance of contaminants. Test or Analysis to Detect Failure Mode <p><u>Acceptance</u></p> <p>Functional test -- Complete functional testing to assure that the controls operate smoothly and that the rope can be extended and retracted</p> <p><u>Certification</u></p> <ul style="list-style-type: none"> a. Qualification test consists of: working load test with 200 lb. and 600 lb. static loads, verification of smooth operation with static loads applied, verification that a max force (during one-hand operation) of approximately 50 lbs. is exerted during ratcheting with the crank grip in the 90° position. b. Stress analysis to certify this tool for 584 lbs. working load with 1.4 safety factor c. Thermal qualification testing to verify this tool for a temperature environment of -200°F to +350°F for 160 hours <p><u>Turnaround</u></p> <ul style="list-style-type: none"> a. Complete functional testing will be performed once a year, or after each mission use to assure that the controls operate smoothly and that the rope can be extended and retracted b. Replace Kevlar rope after each mission use c. Inspect Kevlar rope for fraying or other damage once a year

CRS-23

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PAGE 24 OF 72

FMEA		NAME, QTY & DRAWING REF DESIGNATION	CRITY	FAILURE MODE AND CAUSE	FAILURE EFFECT ON IND-ITEM	RATIONALE FOR ACCEPTANCE			
REF	REV								
3D		EVA WINCH (2) SED 33101570 (Continued)	2/1R	Mode: Transmission jams Cause: • Material failure • Contamina- tion	1. Unable to cradle RMS or payload which prevents closing payload bay doors. 2. Unable to close payload bay doors. Redundancy - 1. RMS jettison system. 2. Second EVA winch.	<p>3. Inspection:</p> <p><u>Manufacturing</u> (Completed)</p> <ul style="list-style-type: none"> a. Accomplish NDE on piece parts prior to assembly. b. Verify certificate of compliance on materials c. Verify as-built configuration. d. Clean and apply lubrication according to drawing requirements <p><u>Turnaround</u></p> <ul style="list-style-type: none"> a. Perform visual examination for damage to transmission or separable parts during cleaning b. Inspect for surface contamination and clean according to PSS891A-05001 c. Verify completion of functional test for reacceptance <p>4. Failure History</p> <p>JH0004 - A deterioration of the control handle positioning springs that correctly position the spool pawl. New springs and spring guides have been lubricated and installed on all winch assemblies, with the exception of S/N 1001, the qualification unit. All units fitted with the new spring guide assemblies were functionally tested by reeling out 5 feet of rope, retracting by automatic reel in and ratchet handle, and verify ratchet out feature. Reference TPS 2B220018.</p> <p>JH0007, JH0008 - During thermal testing at the -200°F cold functional test, the ratchet control lever would not move into its detents, the rope could not be reeled out, and the crank grip would not unscrew. All units were relubricated with Dow Corning moly kote 3218 and functionally tested successfully (TPS 51620012).</p> <p>5. Operational Use:</p> <ul style="list-style-type: none"> a. <u>Operational Effect of Failure</u> The winch cannot be used if the transmission jams b. <u>Crew Action</u> The PHO can be used to close the PLBD and cradle the RMS c. <u>Crew Training</u> This crew action will be incorporated into the EVA crew training flow d. <u>Mission Constraints</u> None identified e. <u>In Flight Checkout</u> No in flight checkout of the winch will take place. Declare its use during EVA 	10	X	0
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PHI PART-D BY P. F. THOMPSON

Support R&D (2010-11-20)

APPENDIX B BY T. O. REED

180 || Page

CS-24